Seaplanes within a Seabase Environm

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NAVSEA
WARFARE CENTERS
Carderock Division

CISD

ONR
Science & Technology

NAVAIR
Naval Air Systems Command

Outline

- Seaplane Background
  - Rough Water Operations
- Seaplane Integration in a Sea Base
- Summary

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- USN Museum at WNY
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- SAIC
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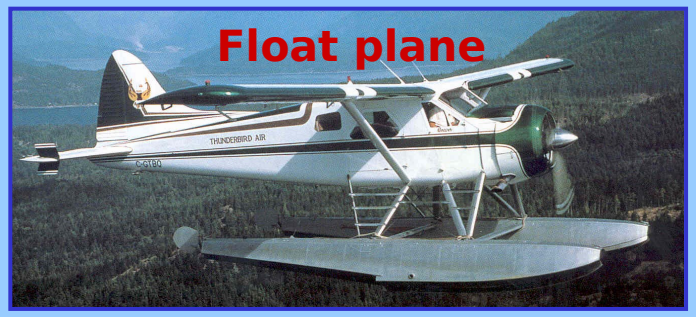
The Defense Science Board's report on Seabasing identifies 12 issues that must be addressed to make Seabasing a reality. The report states:

"Among the issues on the list, three stand out as especially important that must be developed … 2) a heavy-lift aircraft (>20 tons) with theater wide range that can be based at sea."

"The bottom line: future heavy lift aircraft must be capable of operating in austere environments and from the Seabase."

Seaplane Background



Types of Seaplanes

Alternate Landing Systems

Convair Seadart

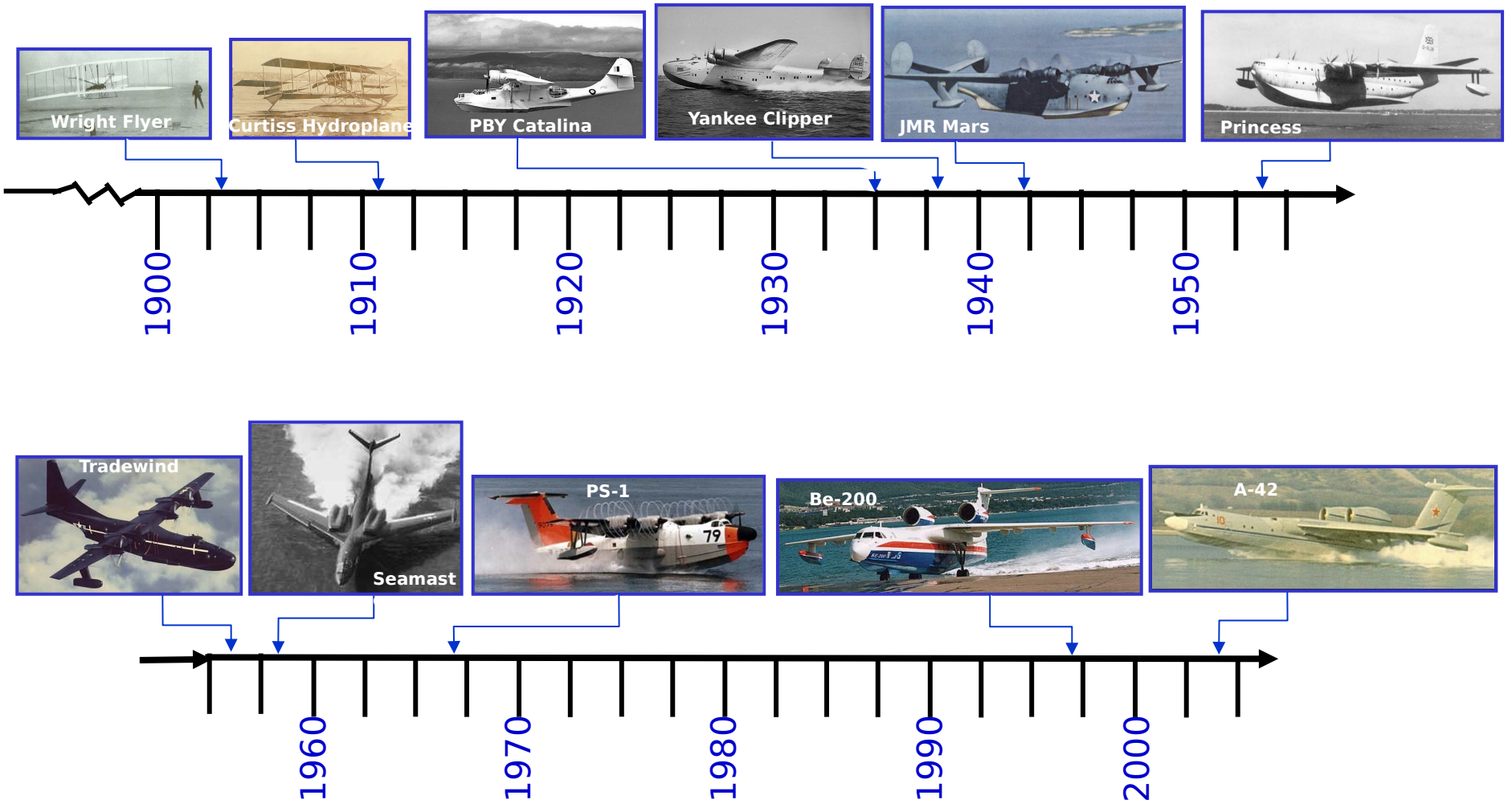
De Havilland XC8a Buffalo

Bell ACLS

Stroukoff YC-123E

HRV-1 Hydrofoil Amphibian

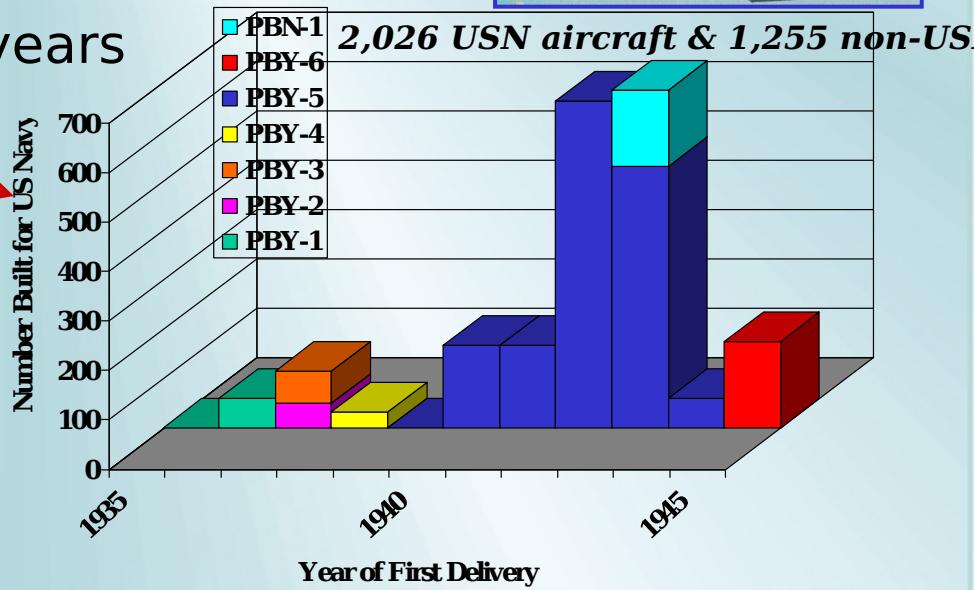
Seaplanes Evolution

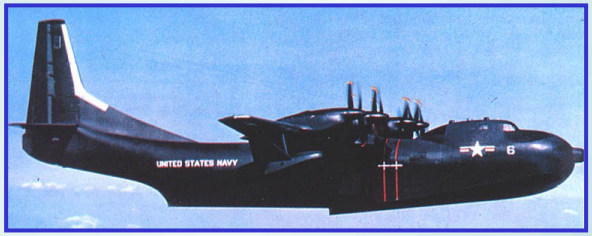


Rich USN Seaplane Legacy

- Operated seaplanes ~ +50 years
- Thousands in service

PBY Catalina
217 - PB2Y Coronado
1,366 - PBM Mariner
284 - P5M Marlin
464 - HU-16 Albatross
6 - JMR Mars
11 - R3Y Tradewind

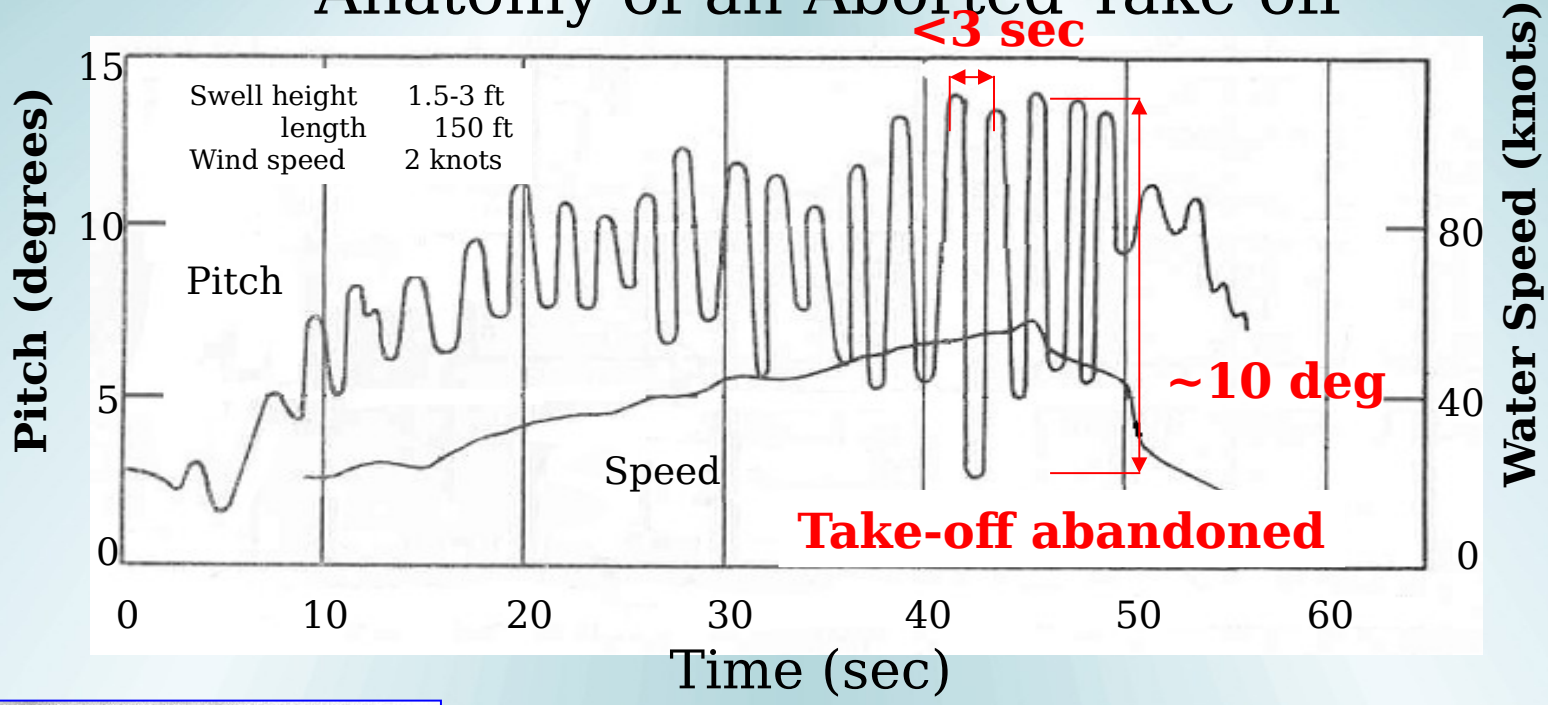




Modern Seaplanes

Rough Water Operation

Anatomy of an Aborted Take-off



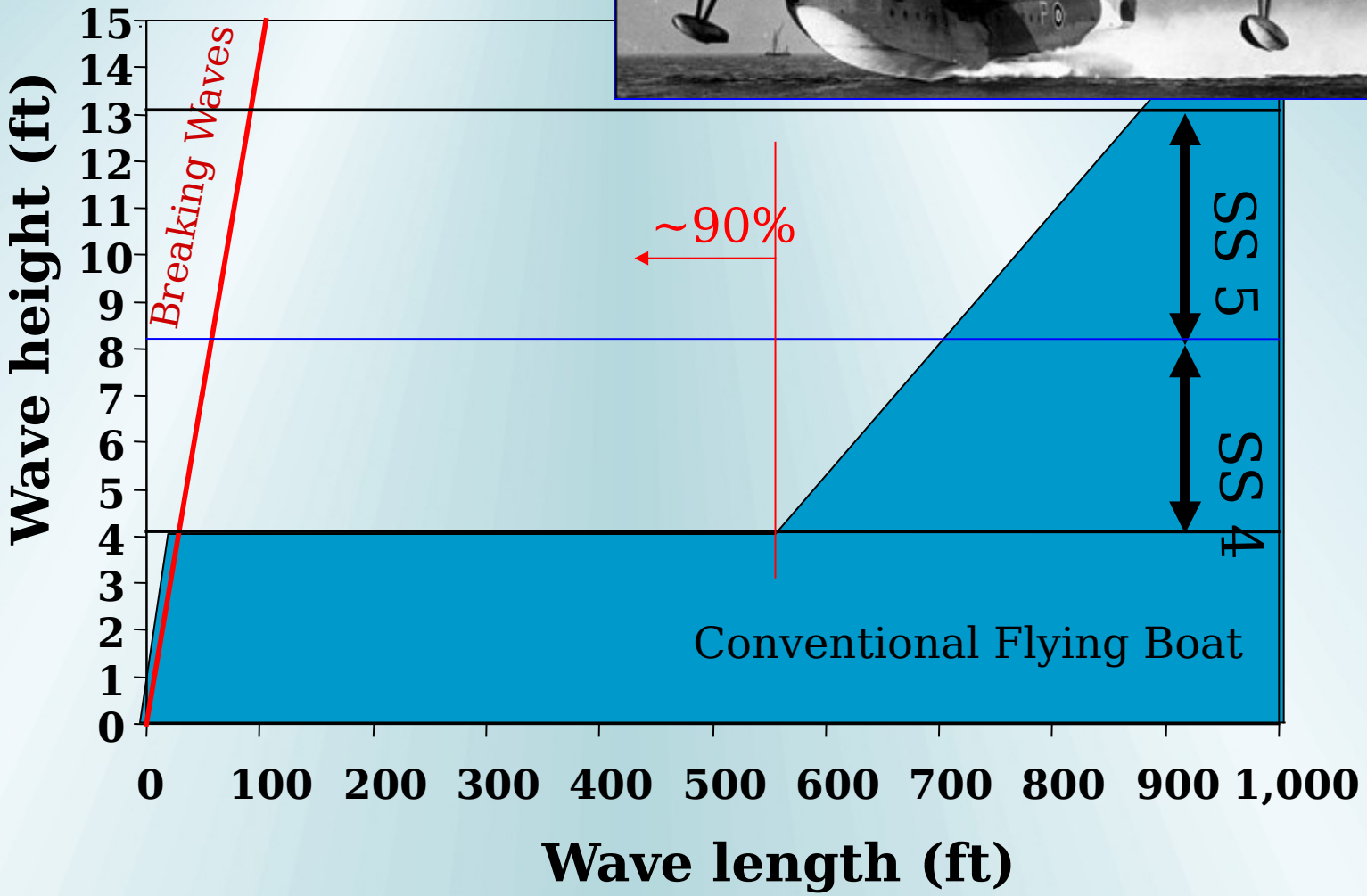
"Porpoising worst when stability limits close together & porpoising frequencies = rate of striking crests"

Perception – consequences of loss of control are critical

- Crash
- Plow-in
- Stall

Operating Limits

~ 80,000 lb Aircraft



Operating Limits

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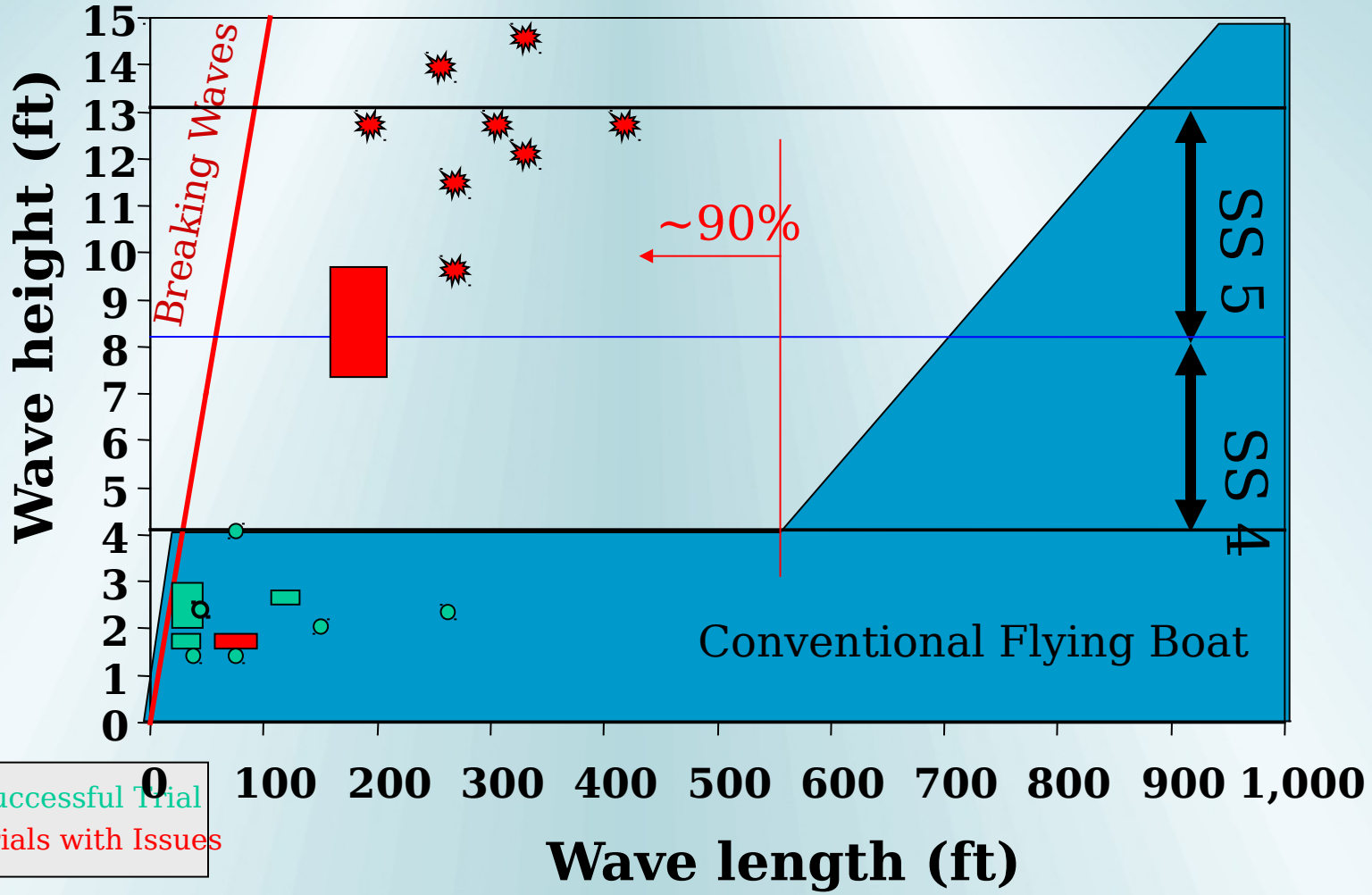
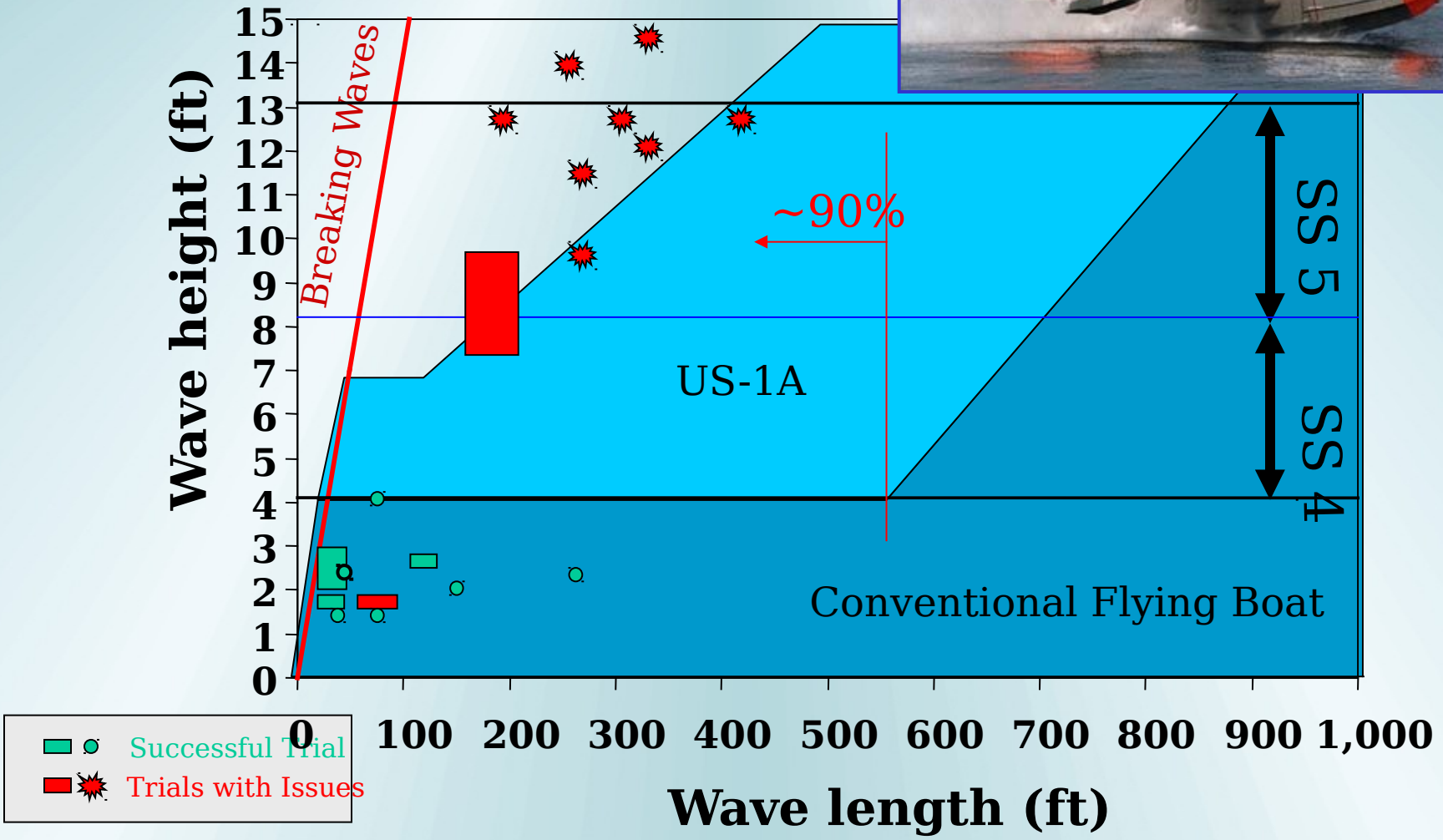
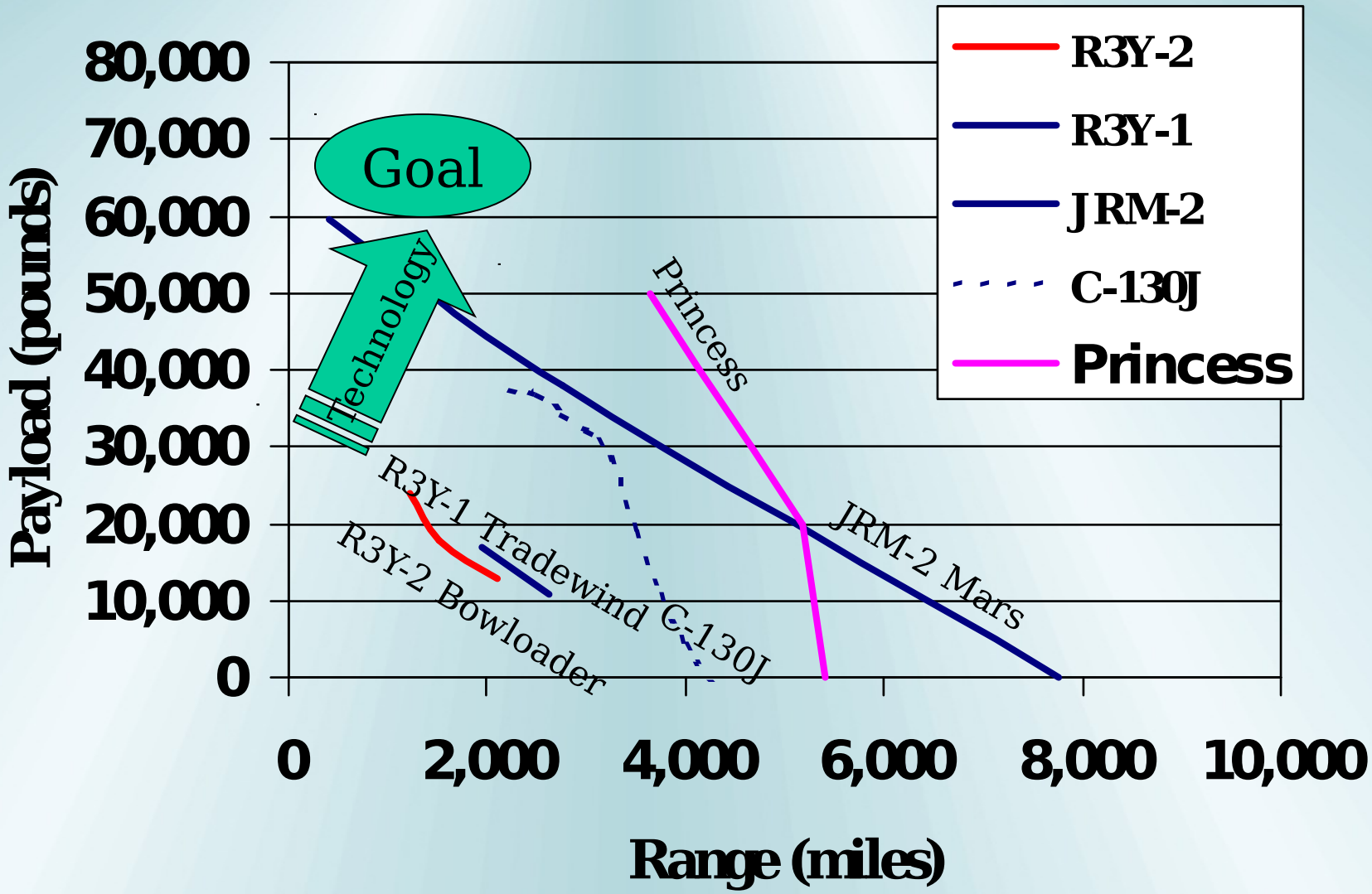


Operating Limits

hin Meiwa US-1A - 79,000 lb Aircraft

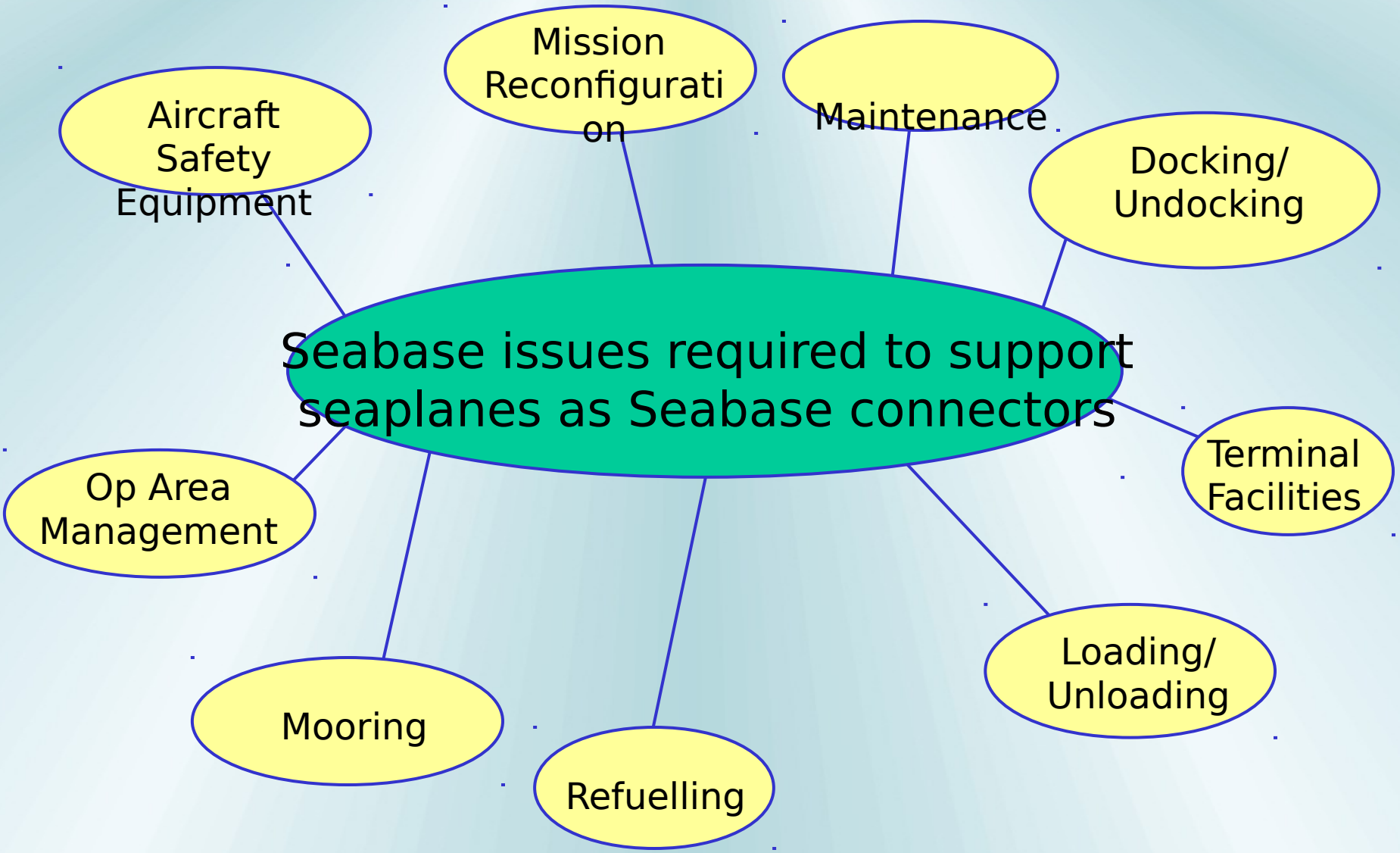


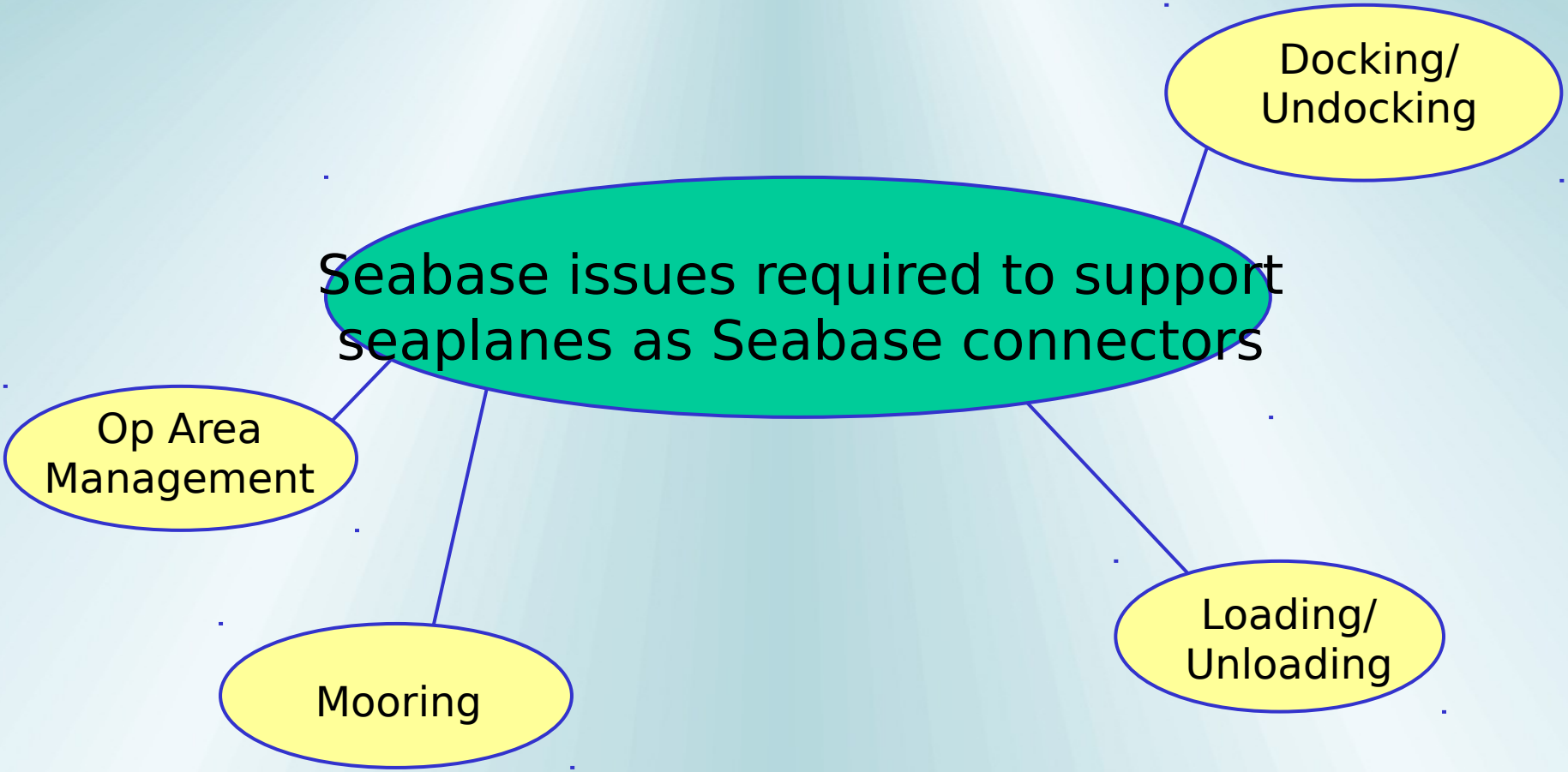
RANGE vs PAYLOAD



eaplane Integration in a Sea Bas

Seabase issues required to support seaplanes as Seabase connectors


Seabase issues required to support seaplanes as Seabase connectors
Mission Reconfiguration
Maintenance
Aircraft Safety Equipment
Docking/ Undocking
Terminal Facilities
Op Area Management
Loading/ Unloading
Mooring
Refuelling

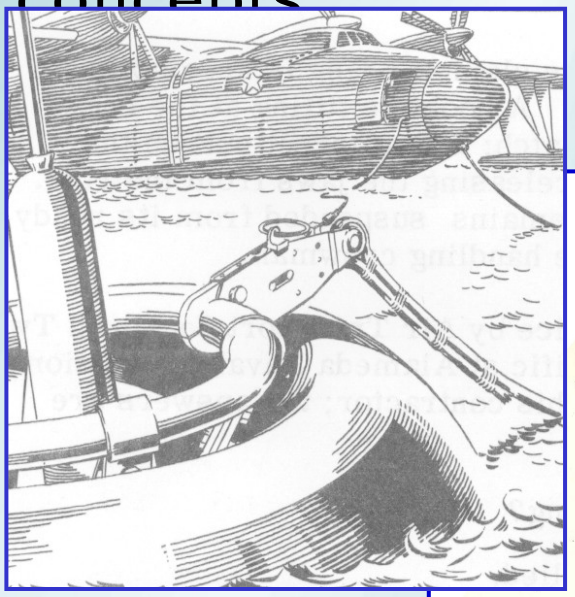

Seabase issues required to support seaplanes as Seabase connectors
Docking/ Undocking
Op Area Management
Mooring
Loading/ Unloading

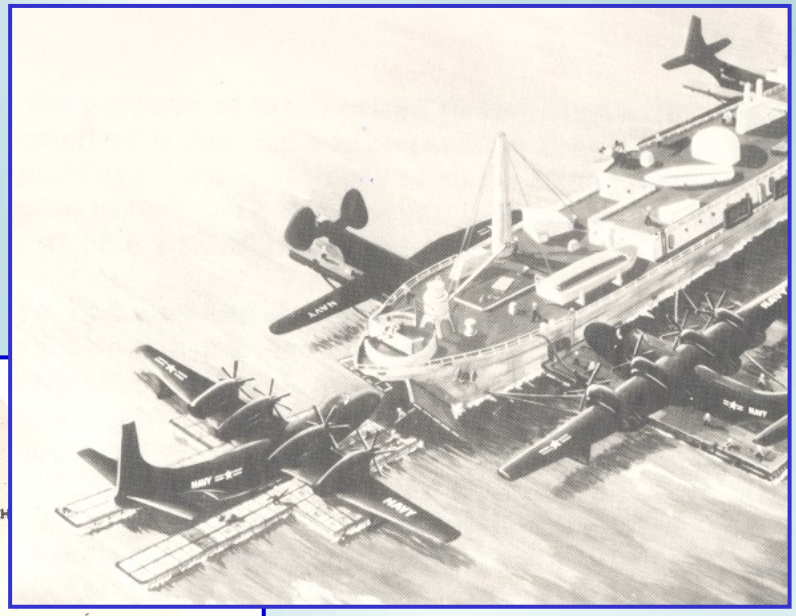
Mooring and Docking

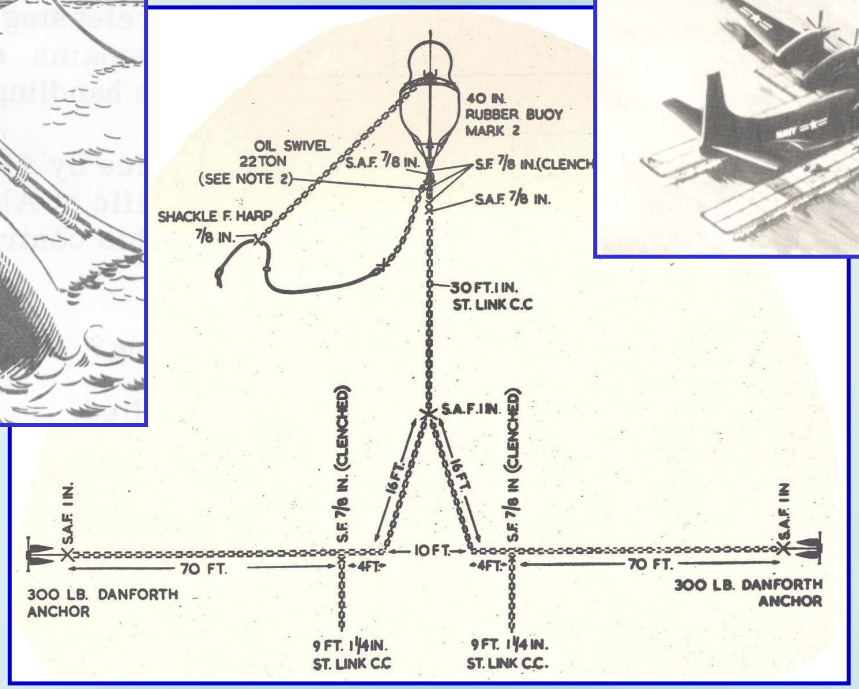
Payload transfer with the seaplane at the Seabase requires either:

(a) Securing and interfacing with the aircraft in the water
(b) Removing the aircraft from the water via beaching or docking

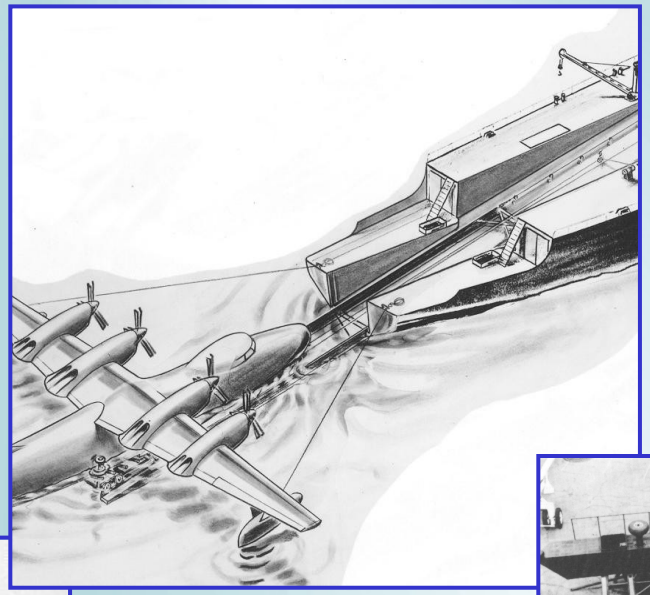
Early seaplane ***at sea*** mooring and interfacing concepts

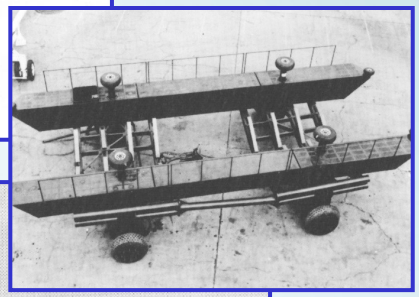


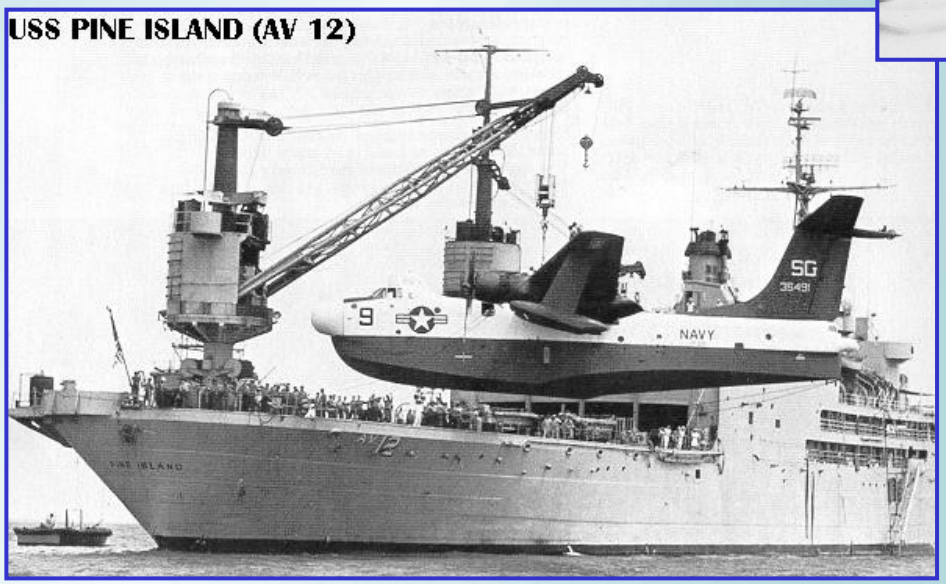


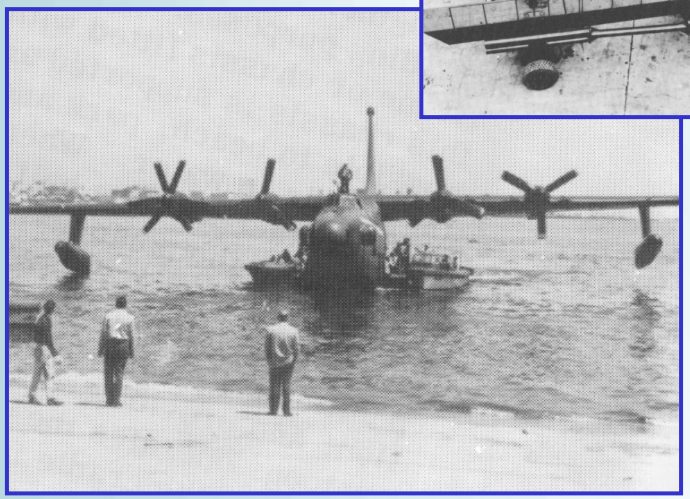


Early seaplane ***out of the water*** docking and interfacing concepts

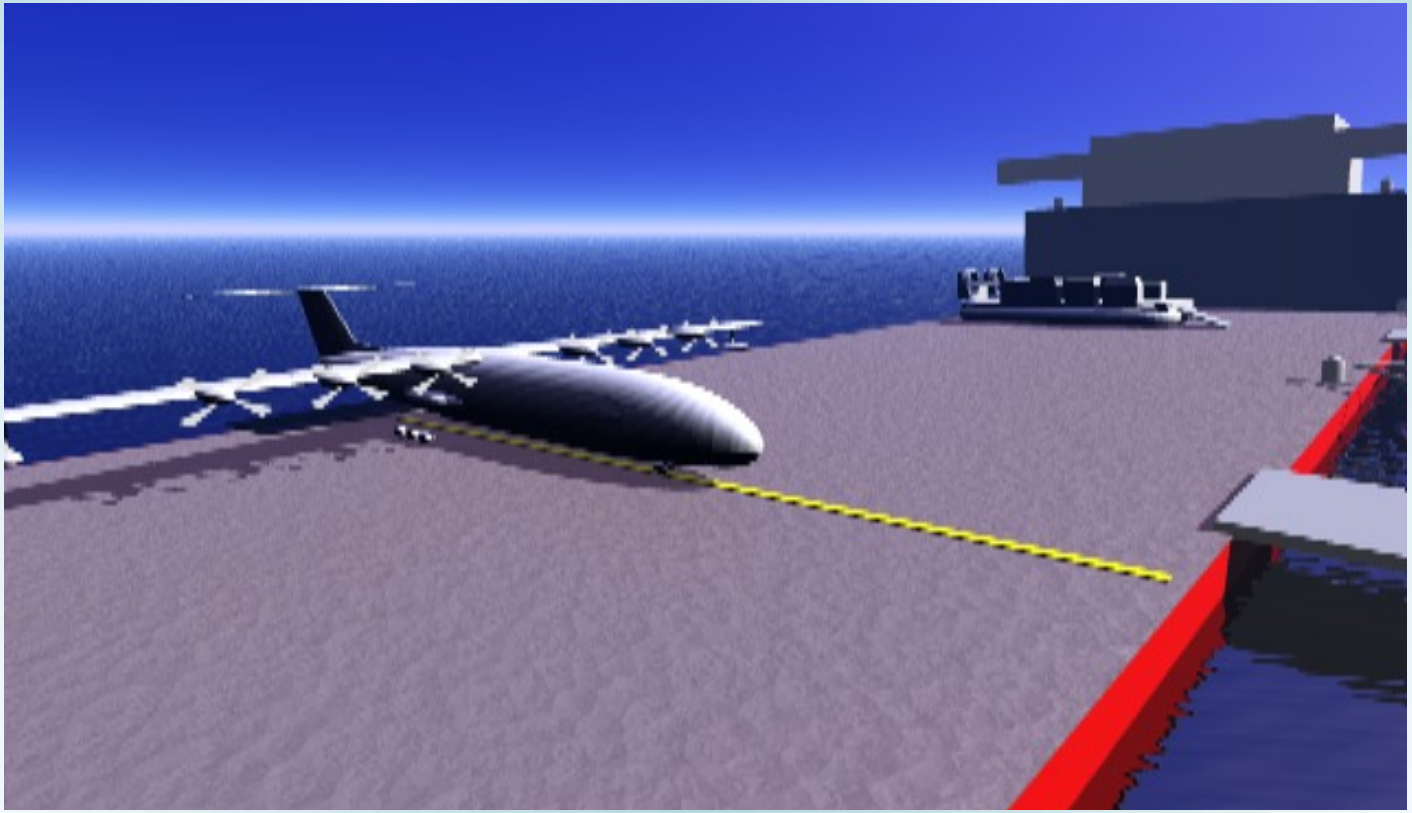


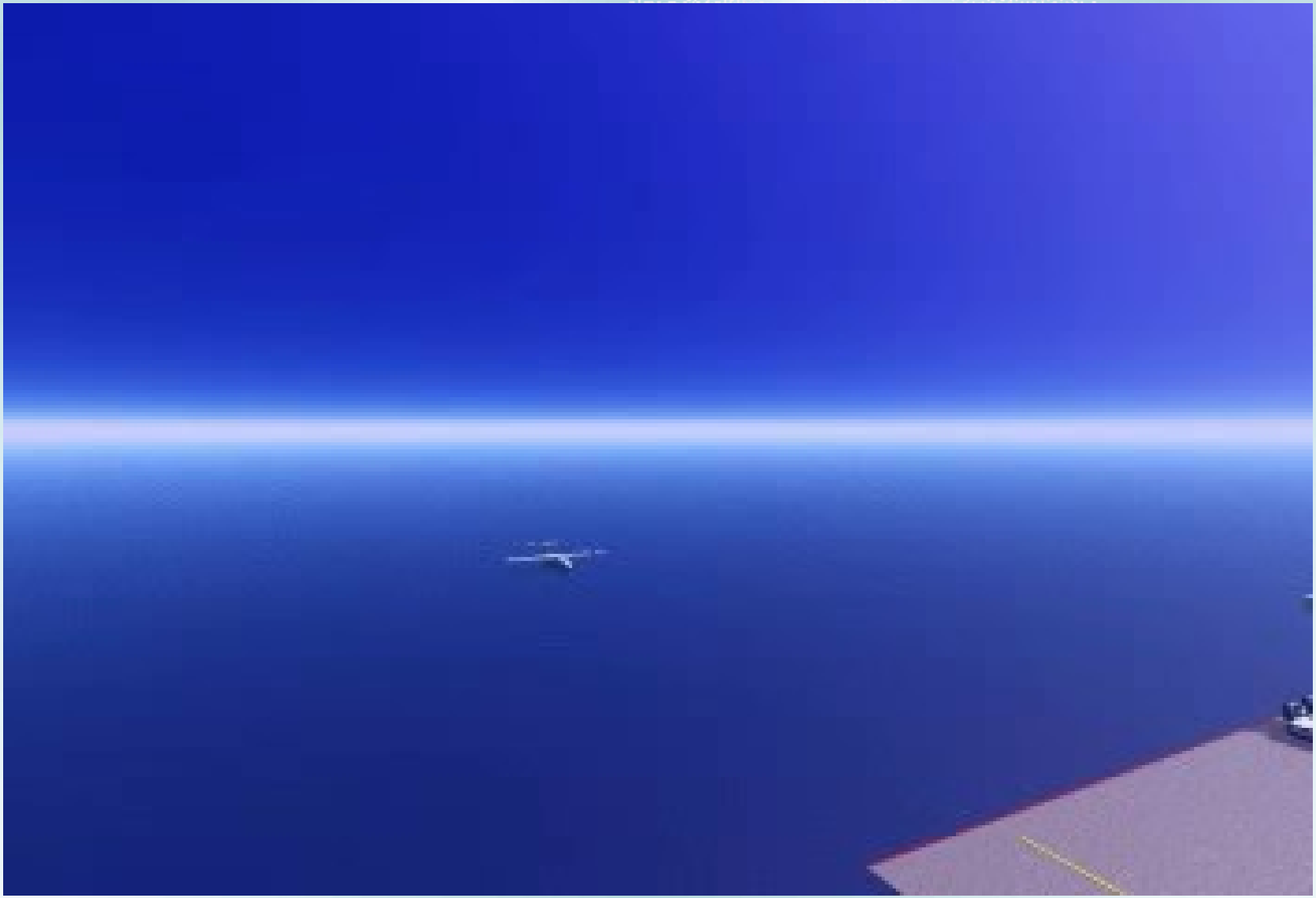






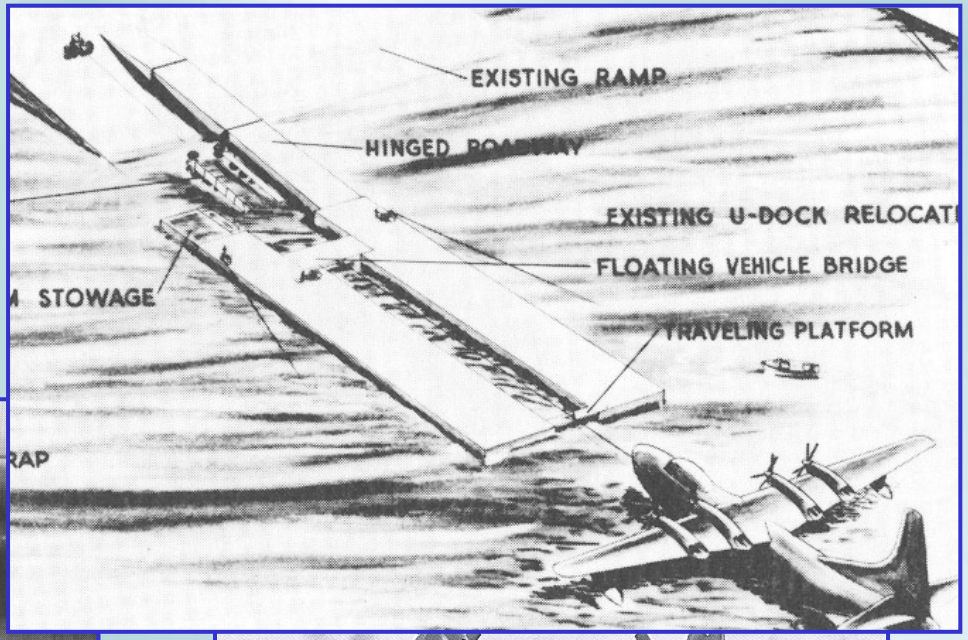
We propose expanding the ITS concept to be a Seabase – Seaplane interface

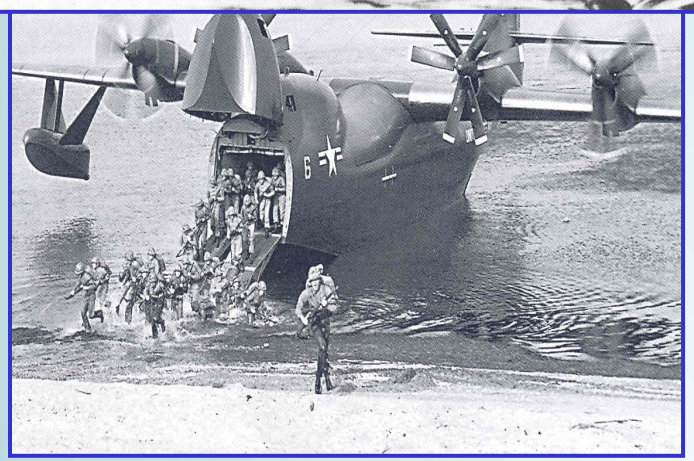




Seabase to Shore Connector

Early seaplanes
beaching concepts

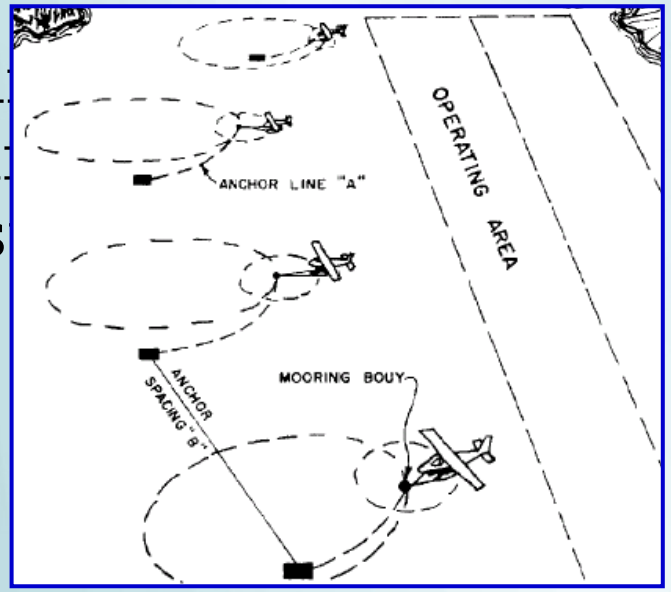




Op Area Management

Seabase operational area management for airstrip:

- Control of pollution
- Control of intruders on airstrip (commercial or military traffic)
- Maintenance (or movement) or markers
- FOD and debris control a
- rescue, sa
- asure sea s



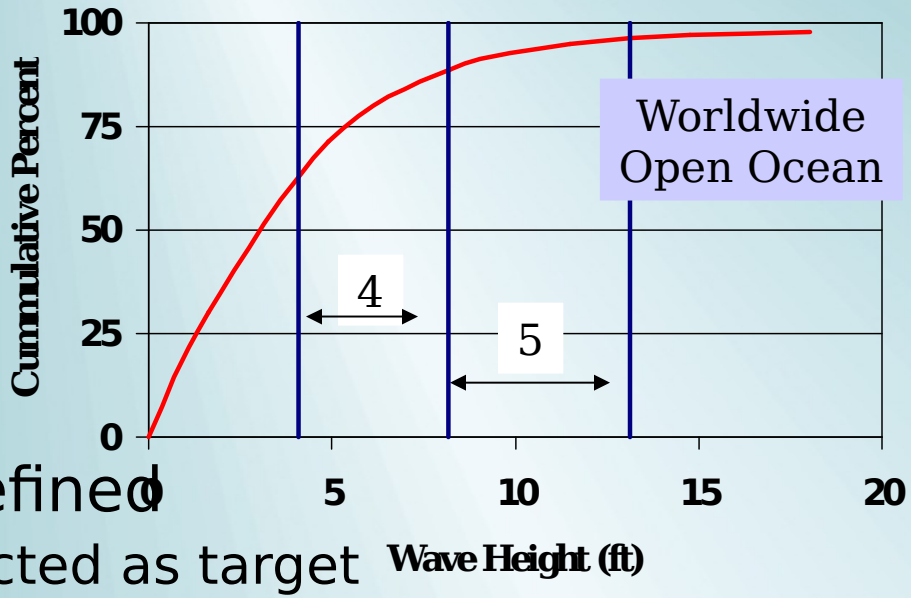
Conclusions

- **Seaplanes can provide useful capabilities to the Sea Base**
- **Methods to integrate seaplanes in a Sea Base are known**
- **Safe & efficient personnel/cargo transfer in rough seas is c**

Questions

Backup

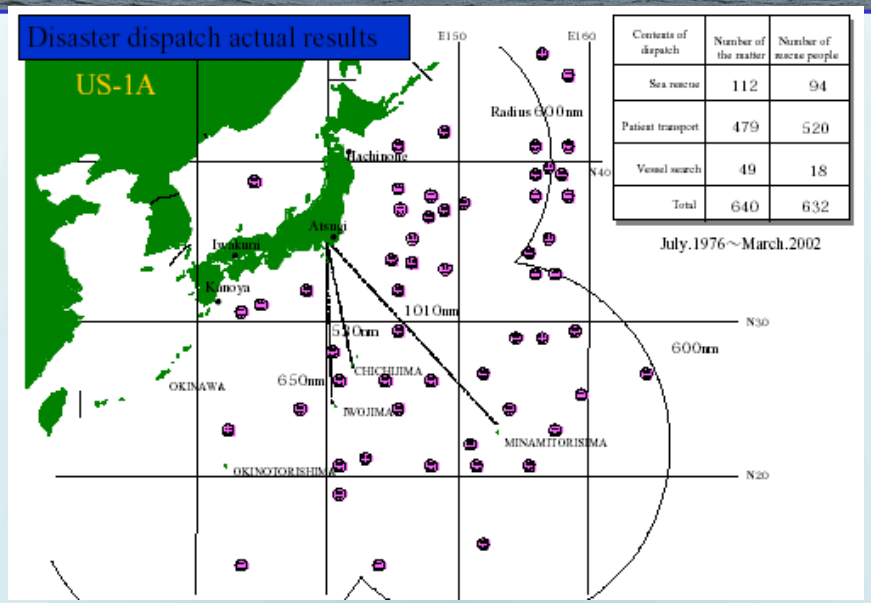
- Reliable rough water operation is <u>crucial</u>
  - Take-off
  - Landing
  - Taxiing
  - Load/unload
  - Survival
    - Demonstrated in gales
    - Appropriate mooring systems



- Required operability is undefined
  - Operations through SS 4 selected as target
- Good rough water performance data is scarce

Characteristics

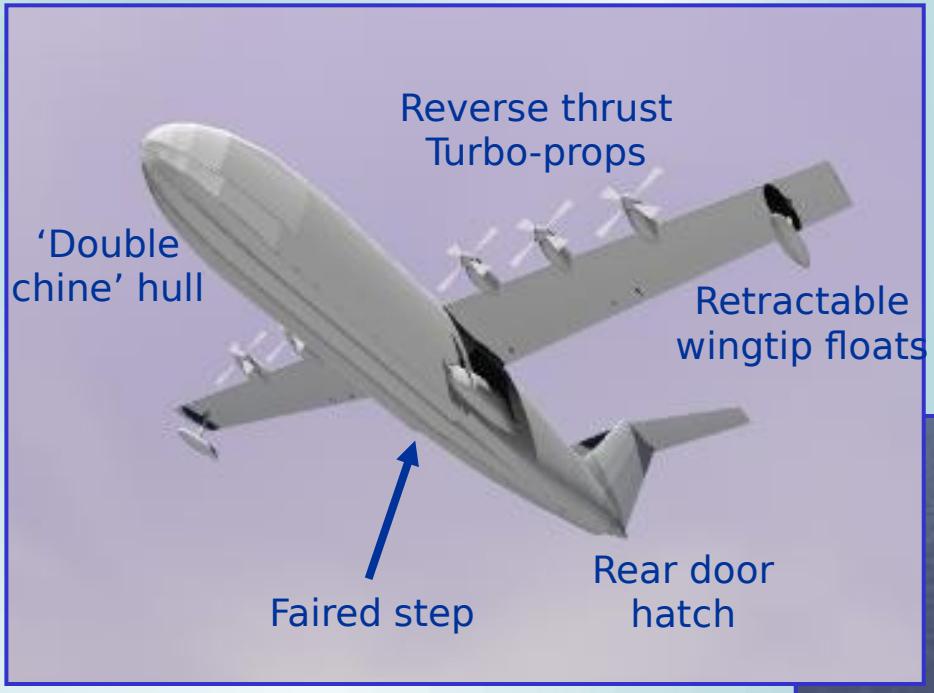
MTOW (lbs)
- sheltered water
94,800
- open ocean
79,400
Speed (knots)
230
Range (nm)
2,300



Contents of dispatch	Number of the matter	Number of rescue people
Sea rescue	112	94
Patient transport	479	520
Vessel search	49	18
Total	640	632

Technology

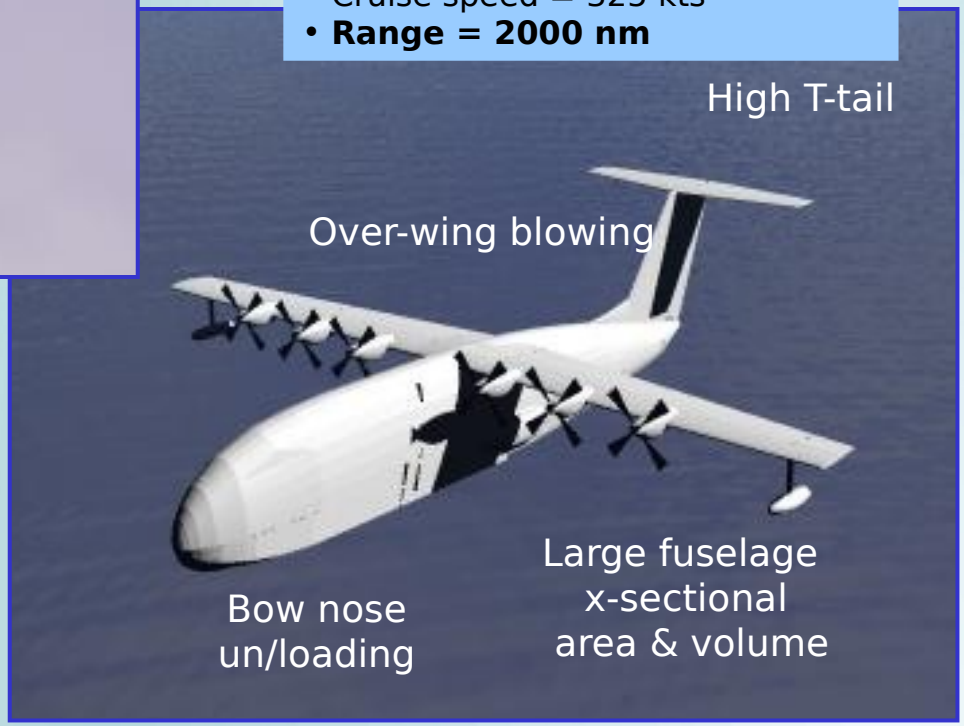
1967 delivery
Hull
- slender hull
- spray suppression systems
- STOL
- blown flaps, rudder, elevator

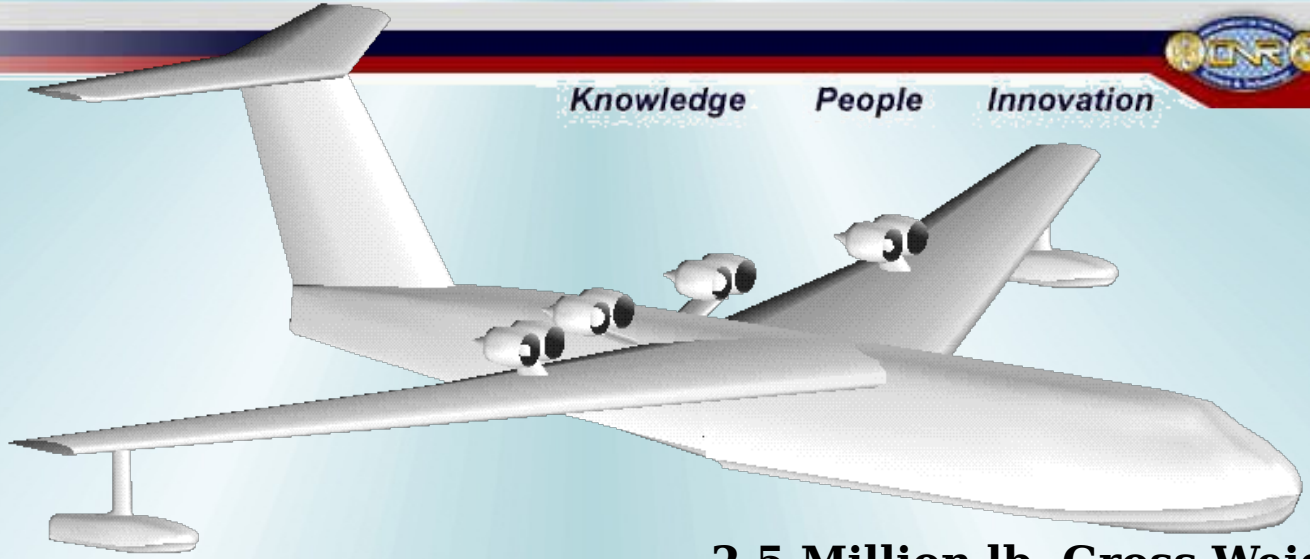


Aircraft weights (lbs)
- **MTOW = 260,000**

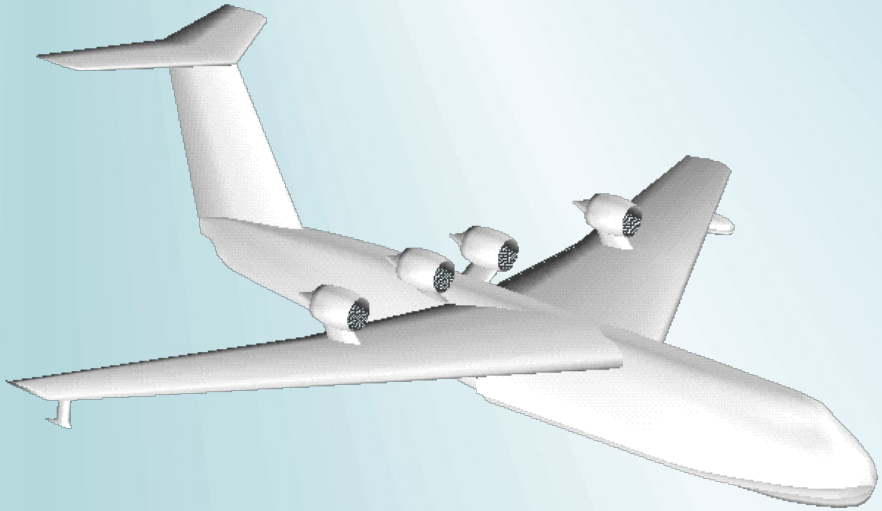
Payload & Cargo
- Payload weight = 60,000 lbs
- Cargo = **180 troops** or **20' ISO containers**

Speed & Range
- Cruise speed = 325 kts
- **Range = 2000 nm**





2.5 Million lb. Gross Weight



1 Million lb. Gross Weight

Conclusions:

- Seaplanes can be effective Seabase connectors (either from intermediate base for force closure or to shore)
- The technology exists and has been demonstrated to interface seaplanes with the Seabase
- The ITS, when combined with existing concepts, will make an efficient seaplane-Seabase interface

Comparison of conceptual design

	Shin Meiwa US-1A	C-130J	Seaplane Design Concept	C-17	C- 5
MTOW (lbs)	94,800	155,000	260,000	585,000	840,000
Payload (lbs)	30,000	34,000	60,000	170,900	270,000
Empty weight (lbs)	56,200	79,291	127,000	278,000	337,935
Length / Height (ft)	110 / 33	98 / 39	144 / 47	174 / 55	247 / 65
Wing span, b, (ft)	109	132.6	163	171	223
Wing Area, S (ft^2)	1,460	1,745	2,650	3,800	6,200
Range, (nm) (with payload)	2,300	1,600	2,000	4,741	6,320
Cruise Speed, (kts)	230	362	368	450	450

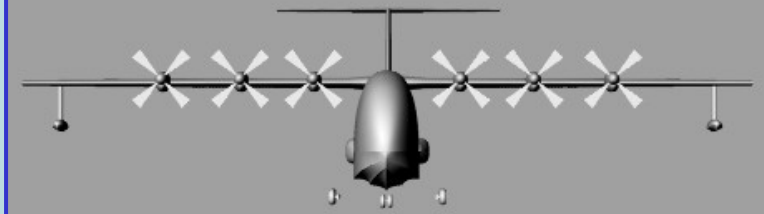
US-1A

C- 5

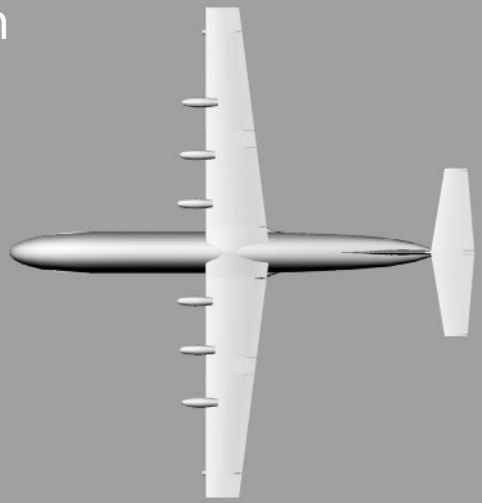
C-130

C-17

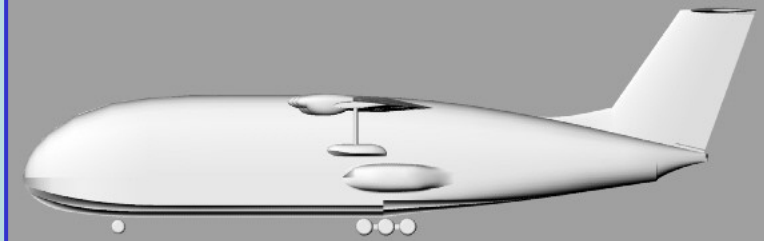
front



plan



side



Primary

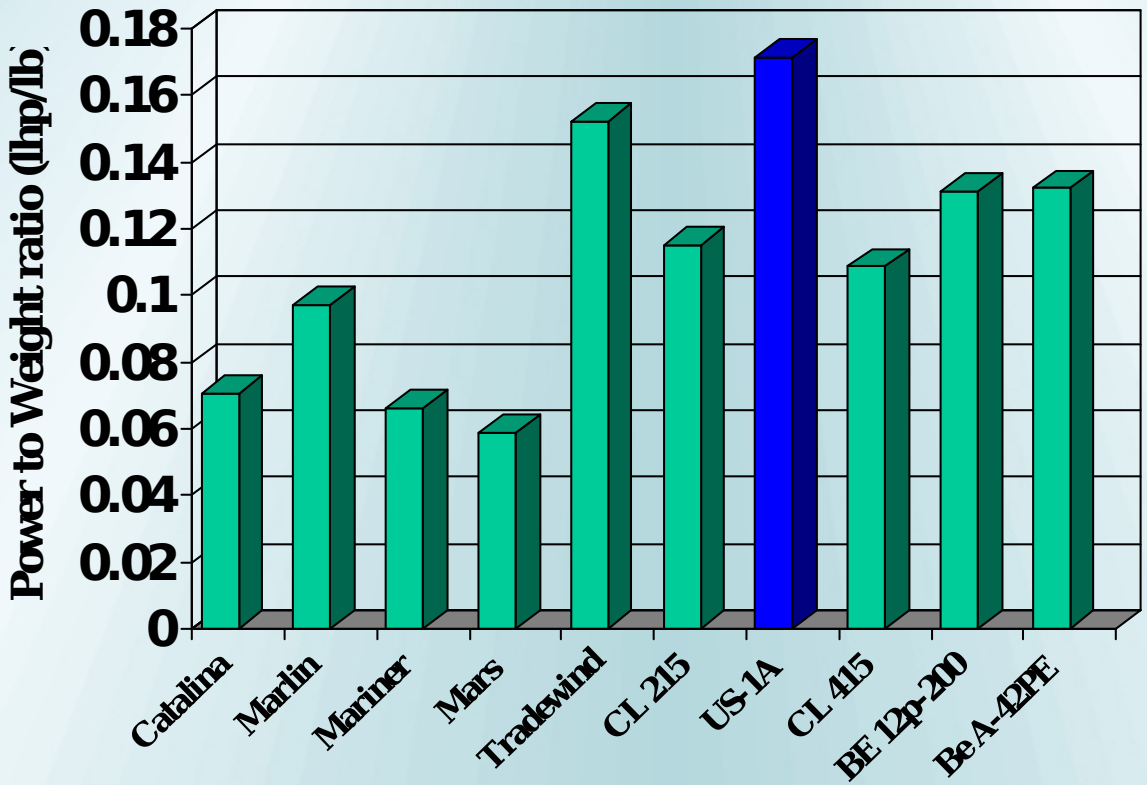
- Force closure
- Logistics delivery
- Refueling

Secondary

- Reconnaissance
- Search & rescue
- Para - drop

Rapid take-off & landing is important

- awareness of sea surface and weather
- exploit benign patches of water
- STOL technology
- power



Cargo handling